PAT-NO: JP411049719A

DOCUMENT-IDENTIFIER: JP 11049719 A

TITLE: OMEGA-PHENYL-(OMEGA, OMEGA-2)-DIENO-FATTY ACIDS, THEIR PRODUCTION AND PRODUCTION OF OMEGA-PHENYL STRAIGHT-CHAIN FATTY ACIDS

PUBN-DATE: February 23, 1999

INVENTOR-INFORMATION:
NAME
KITAGAWA, KOUICHI
KANO, TAKESHI
TANIGAWA, ISAMU

ASSIGNEE-INFORMATION:
NAME COUNTRY
SHIONO KORYO KK N/A

APPL-NO: JP09227120

APPL-DATE: August 8, 1997

INT-CL (IPC): C07C057/42, C07C051/353 , C07C051/36 , C07C057/30

ABSTRACT:

PROBLEM TO BE SOLVED: To obtain the subject new fatty acids useful as various synthetic raw materials or intermediates.

SOLUTION: The fatty acids are represented by the formula Ph-CH=CH-CH =CH-(CH<SB>2</SB>)<SB>n</SB>-CO<SP>2</SP>H [Ph is phenyl; (n) is an integer of 2-5], e.g. 7-phenyl-4,6- heptadienoic acid. The fatty acids are obtained by reacting (A) cinnamaldehyde with (B) a Witting reagent represented by the formula BrPh<SB>3</SB>P(CH<SB>2</SB>)<SB>n+1</SB>CO<SB>2</SB>H (e.g. 3-carboxypropyltriphenyphosphonium bromide) in an amount of about

0.5-3 mol
based on 1 mol component (A) in the presence of (C) an alkali in an amount of
about 2-3 mol based on 1 mol component B (sodium hydride or potassium t-butoxide) in (D) an organic solvent (diethyl ether or the like) in an amount
of about 3-20 times based on the component B at about -70 to +30°C for 1-24
hr.

CLAIM + DETAILED DESCRIPTION

[Claim(s)]

[Claim 1]omega-phenyl-(omega, omega-2)-JIENO fatty acid shown by general formula (I) Ph-CH=CH-CH=CH-$(CH_2)_n$-CO_2H (the inside Ph of a formula expresses a phenyl group, and n expresses an integer of 2-5).

[Claim 2]Cinnamaldehyde and general formula (II) $BrPh_3P(CH_2)_{n+1}CO_2H$ (the inside Ph of a formula) [a phenyl group] n -- an integer of 2-5 -- expressing -- a manufacturing method of the omega-phenyl-(omega, omega-2)-JIENO fatty acid according to claim 1 making the Wittich reagent shown react under alkali existence and in an organic solvent.

[Claim 3]The omega-phenyl-(omega, omega-2)-JIENO fatty acid according to claim 1 Under metal catalyst existence, A manufacturing method of omega-phenyl straight-chain fatty acid shown by general formula (III) Ph-$(CH_2)_{n+4}$-CO_2H (the inside Ph of a formula expresses a phenyl group, and n expresses an integer of 2-5) making it react to hydrogen.

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to omega-phenyl-(omega, omega-2)-JIENO fatty acid conventionally useful as document unindicated various synthetic powder thru/or an intermediate, and the manufacturing method of those. It is related with the manufacturing method of the various synthetic powder thru/or omega-phenyl straight-chain fatty acid useful as an intermediate which furthermore goes via omega-phenyl-(omega, omega-2)-JIENO fatty acid.

[0002]

[Description of the Prior Art]About the Wittich reaction, it is known well conventionally

(Org.Reaction and Vol.14 reference). However, there is no example to which the Wittich reagent (henceforth the Wittich reagent II) indicated to be cinnamaldehyde by general formula (II) $BrPh_3P(CH_2)_{n+1}CO_2H$ (the inside Ph of a formula expresses a phenyl group, and n expresses the integer of 2-5) was made to react. General formula (I) Ph-CH=CH-CH=CH-$(CH_2)_n$-CO_2H which is a new molecular entity by performing the above-mentioned reaction in this invention (the inside Ph of a formula) [a phenyl group] n -- the integer of 2-5 -- expressing -- it found out that the omega-phenyl-(omega, omega-2)-JIENO fatty acid shown was compoundable. It is possible to lead the above-mentioned compound to omega-phenyl straight-chain fatty acid easily shown as an intermediate by general formula (III) Ph-$(CH_2)_{n+4}$-CO_2H (the inside Ph of a formula expresses a phenyl group, and n expresses the integer of 2-5). this invention is still more inexpensive -- acquisition -- in order to use easy cinnamaldehyde and the Wittich reagent II as a raw material, it is an industrial very advantageous method.

[0003]therefore -- the purpose of this invention is inexpensive -- acquisition -- it is compounding the omega-phenyl-(omega, omega-2)-JIENO fatty acid which is a new molecular entity by using easy cinnamaldehyde and the Wittich reagent II as a raw material, and leading to omega-phenyl straight-chain fatty acid by making the above-mentioned compound into an intermediate further.

[0004]

[Means for solving problem]This invention is general formula (I)Ph-CH=CH-CH=CH-$(CH_2)_n$-CO_2H (the inside Ph of a formula). [a phenyl group] n -- the integer of 2-5 -- expressing -- the omega-phenyl-(omega, omega-2)-JIENO fatty acid shown. And cinnamaldehyde and general formula (II) $BrPh_3P(CH_2)_{n+1}CO_2H$ (the inside Ph of a formula) [a phenyl group] n -- the integer of 2-5 -- expressing -- under alkali existence, [the Wittich reagent shown] The manufacturing method of said omega-phenyl-(omega, omega-2)-JIENO fatty acid making it react in an organic solvent, and said omega-phenyl-(omega, omega-2)-JIENO fatty acid Under metal catalyst existence, It is a manufacturing method of omega-phenyl straight-chain fatty acid shown by general formula (III) Ph-$(CH_2)_{n+4}$-CO_2H (the inside Ph of a formula expresses a phenyl group, and n expresses the integer of 2-5) making it react to hydrogen.

[0005]It will be as follows if a reaction formula shows the manufacturing method of this invention.

Ph-CH=CH-CHO+$BrPh_3P(CH_2)_{n+1}CO_2H$->Ph-CH=CH-CH=CH-$(CH_2)_n$-CO_2H-> Ph-$(CH_2)_{n+4}$-CO_2H [0006]The cinnamaldehyde which is a starting material of this invention can be easily inexpensive as a perfume raw material thru/or various synthetic powder, and can be obtained. Wittich reagent (II) which is another starting material is a publicly known compound,

and is industrially and easily available. With a method given in document (J. Org.Chem., 42, 2783 (1977)), It is also possible to make omega-bromo straight-chain fatty acid shown by general formula $Br(CH_2)_{n+1}CO_2H$ (the inside n of a formula expresses the integer of 2-5) and the triphenyl phosphine shown by chemical formula Ph_3P react, and to manufacture easily.

[0007]As an example of this WITIHI reagent, bromination 3-carboxypropyl triphenyl phosphonium, Bromination 4-carboxybutyl triphenyl phosphonium, bromination 5-carboxypentyl triphenyl phosphonium, and bromination 6-carboxyhexyl triphenyl phosphonium are mentioned. The amount of this WITIHI reagent used can illustrate about 0.5 mol - about 3 mol of within the limits of about 0.5 mol - about 1 mol more preferably to 1 mol of cinnamaldehyde.

[0008]As an example of an alkali, although sodium hydride and potassium t-butoxide, n-butyl lithium, phenyllithium, etc. can be mentioned, use of sodium hydride with easy handling and potassium t-butoxide is preferred. The amount of the alkali used is used in about 2 mol - about 3 mol to these 1 mol of WITIHI reagents. When the amount of this alkali used is less than a lower limit, a reaction does not fully advance. Since the rate of a subproduct increases when exceeding upper limit, neither is preferred.

[0009]As an organic solvent used for the above-mentioned reaction, diethylether, tetrahydrofuran, dimethylformamide, dimethyl sulfoxide, dimethylacetamide, etc. can be mentioned, for example. Although there are no special restrictions in the amount of these organic solvents used, the range of about abbreviation 3- abbreviation 20 weight twice can be more preferably illustrated to this WITIHI reagent.

[0010]reaction temperature -- about -70 ** - about 30 ** -- more -- desirable -- within the limits of about 0 ** - about 10 ** -- the reaction time can illustrate about 1 hour - about 4 hours more preferably for about 1 hour - about 24 hours.

[0011]After the end of a reaction, after adding ice water, stopping a reaction and an organic solvent extracts a non-acidity part, an acid neutralizes the water layer which remained. Furthermore in accordance with a conventional method, it can refine by the means like after extraction by an organic solvent, washing by water, desiccation of an organic layer, and concentration (for example, silica gel column chromatography), and said omega-phenyl-(omega, omega-2)-JIENO fatty acid can be obtained.

[0012][as an example of the omega-phenyl-(omega, omega-2)-JIENO fatty acid which can be obtained as mentioned above] A 7-phenyl-4,6-heptadiene acid, an 8-phenyl-5,7-octadien acid, a 9-phenyl-6,8-nonadiene acid, and 10-phenyl-7,9-decadienoic acid are mentioned. It is the transformer as cinnamaldehyde of a raw material with double bond same about the stereoselectivity of the above-mentioned compound like [analysis of ^1H-NMR to] omega. Double bonds of the omega-2nd place are a transformer and Sis's mixture, and the ratio can

illustrate within the limits of transformer/cis- =50 / 50 - 25/75.

[0013]Next, a reduction process is indicated. Although 5% palladium carbon, a Raney nickel catalyst, boron-ized nickel, iridium black, etc. can be mentioned, [as a metal catalyst used for reduction of the omega-phenyl-(omega omega-2)-JIENO fatty acid shown by general formula (I)] Palladium carbon can be illustrated 5% more preferably. the amount of catalyst used receives this omega-phenyl-(omega, omega-2)-JIENO fatty acid -- about 0.01 - about 1 weight twice -- within the limits of about 0.02 - about 0.1 weight twice can be illustrated more preferably.

[0014]As an organic solvent used for the above-mentioned reaction, methanol, ethanol, ethyl acetate, acetic acid, tetrahydrofuran, benzene, hexane, etc. can be mentioned, for example. receiving this omega-phenyl-(omega, omega-2)-JIENO fatty acid, although there are no special restrictions in the amount of these organic solvents used -- about 3 - about 10 -- the range of about weight twice can be illustrated more preferably.

[0015]About 0 ** - about 50 ** of reaction temperature is within the limits of about 15 ** - about 30 ** more preferably, for example, and the reaction time can illustrate about 1 hour - about 6 hours more preferably for about 1 hour - about 12 hours. Hydrogen pressure can be performed under the pressurizing condition under atmospheric pressure conditions and below 10 kg/cm^2.

[0016]omega-phenyl straight-chain fatty acid which removes a catalyst by filtration after the end of a reaction, refines by the means like the silica gel column chromatography after condensing filtrate, and is shown by general formula (III) can be obtained.

[0017]As an example of omega-phenyl straight-chain fatty acid which can be obtained as mentioned above, 7-phenylheptanoic acid, 8-phenyloctanoic acid, 9-phenylnonanoic acid, and 10-phenyldecanoic acid are mentioned.

[0018]

[Working example]Hereafter, although an embodiment explains this invention still in detail, thereby, this invention is not restricted.

[0019]Embodiment 1 4.95 g (44.1 millimole) of synthetic potassium t-butoxide of a 9-phenyl-6,8-nonadiene acid and 50 g of tetrahydrofuran were taught, and it cooled with ice water. Under cooling, 10.0 g (21.0 millimole) of bromination 5-carboxypentyl triphenyl phosphonium was supplied, and it agitated for 1 hour. Then, under cooling, 3.33 g (25.2 millimole) of cinnamaldehyde was dropped, and it agitated as it is for 2 hours. After the end of a reaction, the ice water 100g was added and the non-acidity part was extracted 4 times with 50 g of toluene. Hydrochloric acid extracted the water layer which remained with 50 g of after-neutralization toluene, concentration hardening by drying was dried and carried out after 3 times washing and with anhydrous sodium sulfate with the water 50g, and the light yellow solid was obtained. The obtained solid was refined using the silica gel column which uses hexane/ethyl acetate =5 / 1 (capacity factor) as a developing solvent, and a 3.00 g (62% of

yield to 13.0 millimole and the Wittich reagent) white solid was obtained.

[0020]The result of having analyzed this white solid was as follows.

(1) IR(KBr, cm^{-1}) 3620-2500, and m.p. 54-58 **(2) 3030, 2940-1710 and 990,690 (3) MS (EI) 230 (M^+)

(4) ^{1}H-NMR ($CDCl_3$, delta (ppm)) (m) 1.47-1.55, 1.63-1.76 (m), 2.18 (dt and 5th [transformer object] place CH_2), 2.27-2.42 (m), 5.52 (dt, cis- corporeal 6 place CH), 5.80 () [dt and] transformer object 6 place CH, and 6.13-6.25 (m, 8 place CH) and 6.45 (d.) Transformer object 9 place CH, and 6.53 (d, cis- corporeal 9 place CH), 6.74 (dd, transformer object 7 place CH), 7.05 (dd, cis- corporeal 7 place CH), 7.19-7.43 (m) The above-mentioned transformer and cis-corporeal one express the solid of the double bond of the 6th place. It checked that a product was a 9-phenyl-6,8-nonadiene acid from the above-mentioned analytical value. About the solid of the double bond, the transformer and the double bond of the 6th place of the double bond of the 8th place were the mixtures of the ratio of transformer/cis- =35/65 from analysis of ^{1}H-NMR.

[0021]Embodiment 2 After teaching the synthetic 9-phenyl-6,8-nonadiene acid 10.0g (43.4 millimole) of 9-phenylnonanoic acid, the 5% palladium carbon 0.500g, and 50 g of ethanol and deaerating under a reduced pressure, the inside of a system was substituted by hydrogen gas. It was made to react at the bottom ordinary pressure of churning, and a room temperature for 4 hours. Filtration removed the catalyst after the end of a reaction, concentration hardening by drying of the filtrate was carried out, and the solid of fine yellow was obtained. The obtained solid was refined using the silica gel column which uses hexane/ethyl acetate =5 / 1 (capacity factor) as a developing solvent, and a 7.83 g (33.4 millimole, 77% of yield) white solid was obtained. m.p. of this white solid, IR, MS, and ^{1}H-NMR were analyzed, and it checked that it was 9-phenylnonanoic acid.

[0022]

[Effect of the Invention]This invention can provide various synthetic powder thru/or new molecular entity omega-phenyl-(omega, omega-2)-JIENO fatty acid useful as an intermediate. moreover -- the manufacturing method of this invention is inexpensive -- acquisition -- in order to use easy cinnamaldehyde and the Wittich reagent II as a raw material, it is an industrial very advantageous method. Furthermore, various synthetic powder thru/or omega-phenyl straight-chain fatty acid useful as an intermediate can be easily manufactured by using said new molecular entity as a raw material.

[Translation done.]